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Climbing Towards the Light

In the last issue of Contact, I wrote a piece entitled "The Light at the End of the Tunnel." The title was my response to two very positive initiatives in the February 1997 budget: the continuation of the Networks of Centres of Excellence as a permanent program, and the creation of the Canada Foundation for Innovation. I pointed out that with these initiatives the Government had shown that it understood the need for renewing Canada's research capability, and had taken the first steps in that direction. I then went on to discuss many pressing needs for additional funding in the Research Grants program.

In this issue, I shall continue discussing the needs that are being brought to my attention, this time stressing two areas: NSERC's support for those who become HQP (my preferred interpretation is Highly Qualified People) in science and technology through research training, and the Research Partnerships Program (RPP) which brings university research and industry together. I will also show that the research funding environment within which NSERC operates has changed drastically since the historical base of its budget was set.

I begin with a bold assertion. The needs I shall describe are the price of success: Canada's policies and programs for university research **are** working; Canadian researchers **are** being recognized as

excellent at home and abroad; both basic and project research of high quality **are** being done at Canadian universities; Canadian researchers and industry **are** learning to work together effectively; we **are** solving the problems of our geography by networking our research resources; industry and government **are** recognizing the importance of university research; and the positive impacts of that research on the prosperity and well-being of Canadians **are** already important and growing visibly. What we need now are the resources to stay the course and do enough of all these things to make a difference, because our future depends on it.

The best of the brightest

The graduate students who are engaged in research supported by NSERC are the best of the brightest of our young people. They have to be, because research at the leading edge of science and engineering is very difficult and demanding.

We should be doing all we can to attract the best and the brightest to graduate studies in science and engineering, because the future prosperity and well-being of Canadians will depend to a very large extent on their efforts. We should expand programs like the Undergraduate Student Research Awards which provide motivated undergraduates with their first taste of the challenge and excitement of university research. But we also have to realize that high cost is becoming a barrier to graduate study. There is an implicit cost in the form of foregone earnings, for four or more years in the case of doctoral students, and there is little to be done about that. But it is the explicit costs that are now looming as a barrier. Many graduate students in the natural sciences and engineering (NSE) depend on NSERC funding worth between $15,700 and $17,400 per annum for their support. That means they must live on whatever is left of that after they have paid the tuition fees, and those fees have been increasing recently. Compare that with the poverty level as determined by Statistics Canada -- $17,132 in the large urban areas, and $14,694 in smaller cities. Some students are able to earn additional money by working as teaching assistants, but that is a source of marginal income at the price of a substantial time commitment. What this all adds up to is that student debt load is starting to act as a barrier to graduate study for some very well qualified and motivated candidates.

A parallel case can be made for Postdoctoral Fellows (PDFs) in the NSE. Given the working hours expected of them, these people are paid at about the minimum wage. And those who are treated as fellows rather than employees work without benefits. For comparison, medical residents who work similar hours earn close to 50 percent more and receive full benefit packages.

Obviously these are not new problems, so why hasn't NSERC done something about them? The answer is clear -- NSERC has been looking for the best balance between the value of the awards and the number of awards that it can make within the present budget. And there is little point in raising the limits on what can be paid to Assistants-in-Research or PDFs from research grants if the grants are already inadequate. The conclusion is inevitable: NSERC must

be able to spend much more on the development of HQP in science and technology, or else the next generation of HQP might become seriously depleted. This would produce a decline in our national capabilities in science and technology, at a time when our competitors are investing in increasing theirs.

A partner with industry

For the last decade or more, NSERC has been working to link Canada's university researchers who generate new knowledge with people in industry who could use new knowledge productively. These efforts have produced the range of programs grouped under the RPP label, each of them designed to respond to particular needs and circumstances. Notable among these are: Strategic Projects; Research Networks; and University-Industry Projects, which include Collaborative Research and Development Grants, Industrially Oriented Research Grants, and Industrial Research Chairs.

These research partnership programs operate in the form of partnerships among NSERC, industry, government, and the universities. They have been very successful, and the demand for them has been growing rapidly. What's more, the partners' contributions rose over the years to $1.60 for every dollar of NSERC support in 1996.

These partnerships support project research. Developing a proposal for project research is a complicated and time-consuming process. Industrial partners do not commit their efforts lightly. What has made the programs attractive, however, is that NSERC staff are active in helping turn good ideas into good proposals, and the chances of a good proposal being funded have been high. In effect, the programs have been operated in very much a demand-driven mode. And there are sound strategic reasons for continuing in that way: Canada needs still more interaction between its university researchers and its industries if we are to thrive in the global knowledge-driven economy of the twenty-first century.

But the growing demand for university-industry programs is now colliding with the limits on NSERC's budget. This creates a real problem. On the one hand, one cannot expect industry to continue to work on developing good proposals if the chances of funding are very much reduced. On the other hand, a moratorium on applications will dissipate the momentum of a program that is meeting a strategic need. And diverting money from other programs is no solution, since all the programs that survived the recent budget cuts are themselves both strategically important and underfunded. The only way out that is consistent with government's policy of providing the foundations for future prosperity is a substantial injection of new funds into the RPP budget envelope.

A very different environment

NSERC was founded 19 years ago, and since that time its budget has changed through incremental growth from its historical base in the early years, and through budget cuts recently.

But the environment in which NSERC must meet its mandate has changed drastically. That environment is so different in 1997 from what it was in 1978 that the historical base of NSERC's budget has become irrelevant to today's circumstances. Here are some of those differences:

~ Canadian companies have become dependent on university basic research for their stock of new ideas for the long-term, as global market pressures force them to speed up their product cycles. Even the country's biggest R&D spenders find that this need largely consumes their own intellectual and technical resources, and leaves them little or no capability for the long-term research that had characterized the best industrial research labs in the past. But this reliance of industry on university research creates its own pressures on the universities: the work must be of world-class quality and at the leading edge of knowledge in the field world-wide, so that the Canadian researchers engaged in it might serve as a conduit to all of the world's research output. An example of what this means in practice was revealed in a recent study of tens of thousands of US patents. It turned out that 73 percent of the papers cited in the patents were "public science," mainly basic research published in peer-reviewed journals.

~ NSERC has become almost the only source of support in Canada for basic research in the natural sciences and engineering, and the principal source of public support for the research partnerships between the universities and the private sector.

~ The cost of doing research has increased in many areas. One example is the pervasive use of DNA methods in the life sciences. These expensive methods have greatly increased the potential for discovery, and they cannot be avoided if Canadian research is to continue at the leading edge. Another example is animal research. Maintaining animal colonies for research has become much more expensive with the welcome improvements in the standards for animal care. Another factor in increasing research costs is advanced scientific instrumentation. Many essential new instruments are expensive to purchase and expensive to maintain. And the same holds for special-purpose computers, even though the unit cost of computing power has been declining. Once again, the potential for discovery has increased, and the costs are unavoidable if Canadian research is to remain competitive. And field work, which is so very important in all aspects of environmental research, has become increasingly expensive through price increases in all its components, including transportation and staffing of remote facilities.

~ But some research costs have skyrocketed for an entirely different reason: many services and facilities that used to be available to university researchers for free from government agencies and departments now have to be paid for, or purchased commercially. Ship time for ocean research is a prominent example of this change.

~ The Government of Canada has created the Canada Foundation for Innovation (CFI) to trigger the renewal of research infrastructure in the universities and research hospitals. With the matching requirements of the CFI, the result could be an investment of as

much as $2 billion in new research facilities over the next five or six years. But research facilities have to be operated, and new facilities will cost new money. The universities will have to provide some of that themselves, but I am already hearing that NSERC will be counted on to provide many millions of new dollars annually to help the universities operate their new research facilities in the natural sciences and engineering.

~ All of the above refers to the direct costs of research which is the only category that NSERC supports. However, universities which are responsible for the indirect costs of research are having their own budget problems. The result is that some of the indirect costs are being converted into direct costs through user fees, or through the commercial purchase of replacements for services that the universities have discontinued.

Strategic repositioning

All these changes in Canada's research environment act in the same direction; they create pressures on NSERC's budget.

These pressures are very large. They will probably add up to between two and three hundred million dollars per year. The numbers will become clear over the next several months. For example, the grants selection committees will provide their realistic estimate of the shortfall in the Research Grants budget after the February 1998 competition, but the early signals are that the needs in that area alone may significantly exceed $100 million. And there's no reason to expect that the needs in the other half of NSERC's budget will be any smaller.

Pressures of that magnitude call for nothing less than a **strategic repositioning** of the NSERC budget. Both words are significant: "repositioning" refers to moving the budget from its incremental track from the historical base in 1978 to the new level required to meet the needs as they exist in 1998; "strategic" refers to the long-term advantage to Canada of enabling the research enterprise to realize its potential, precisely in line with the federal government's S&T Strategy.

University researchers whom I have visited in their labs have been proud to show me their accomplishments. But they have also been telling me of the growing obstacles they face because they don't have the money they need. I have been warned to expect many more examples of unrealized potential and opportunities lost to Canada because of inadequate research funding. The case for a strategic repositioning of NSERC's budget can only grow stronger.

Tom Brzustowski
President

Accountability at NSERC

Since NSERC receives its funding through parliamentary appropriations, it has a responsibility to Parliament and to Canadians to ensure that the funds are well managed. Occasionally, it must deal with allegations that may be brought to its attention regarding either the misuse of its funds or breaches of scientific integrity.

The following paragraphs describe the Council's procedures for handling allegations and point out some of the differences in the follow-up, depending on the nature (financial vs. scientific) of the allegation. It should be noted that NSERC is subject to the *Privacy Act* and does not publish or disclose personal information related to specific cases.

Allegations of misuse of funds

NSERC maintains a strong and active interest in the financial management of its funds. There are rigorous mechanisms for routine review of university grant accounts and for investigating allegations of misuse of funds.

All allegations of misuse of NSERC funds, including anonymous allegations, are followed up. NSERC's Review and Investigations team carries out an initial assessment drawing on documentation available at NSERC and at the university. If this review indicates potential problems, the team will undertake an in-depth investigation of the grantee's accounts. The results of this in-depth review may lead to one of the following conclusions: no problems exist, and the account will remain active; ineligible items have been charged to NSERC grants and are to be refunded to the grant account; or fraud is suspected and the case is reported to the RCMP for further investigation. (Because NSERC is a federal agency, it must refer cases of possible financial fraud to federal legal authorities.)

At the conclusion of any financial investigation, the findings may be referred to the Council's Committee on Professional and Scientific Integrity (a subcommittee of the Executive Committee), which reviews cases of financial and scientific integrity breaches and recommends sanctions to the President as appropriate.

Allegations of breaches of scientific integrity

NSERC examines allegations of breaches of scientific integrity only in cases where the complainant is identified; anonymous allegations are not pursued. NSERC carries out an initial review of the allegations to determine whether there is an integrity issue and whether the case involves NSERC funds; the Council has no mandate to pursue complaints that do not relate to its funds. If the initial review confirms these elements, the complaint and all relevant documentation is forwarded to the university with a request for answers to specific questions. The university conducts its own investigation according to its internal procedures, and reports its conclusions to NSERC. The Council reviews the conclusions for due process, adherence to the university policy; and substantiation of the conclusions and actions taken by the university. In some cases, NSERC may go back to the university for clarification or further

analysis. When it is deemed appropriate, conclusions are referred to NSERC's Committee on Professional and Scientific Integrity.

NSERC Awards Presented

During a ceremony in Ottawa on June 11, the winners of the 1997 Canada Gold Medal for Science and Engineering, E.W.R. Steacie Memorial Fellowships, and NSERC Doctoral Prizes were presented with their awards. Representatives from the government, academia, and the business community attended the event.

The 1997 Canada Gold Medal for Science and Engineering was presented to Dr. J. Keith Brimacombe, Alcan Chair of Process Engineering and Director of the Centre for Metallurgical Process Engineering at the University of British Columbia.

In accepting the Medal, Dr. Brimacombe reflected on "the two ingredients essential to the achievement of excellence in research: the nature and nurture of people such as our award winners gathered here..." He also stressed the importance of communicating research successes to the Canadian public. "Research support is not a divine right but must be earned through our successes -- and these must be communicated to the decision-makers. All of us engaged in research in Canada bear this responsibility -- not just NSERC. We must become more active in translating our research successes into concepts and words that society at large understands."

For the text of Dr. Brimacombe's talk on the "Nature and Nurture of Research," and information on all the winners, visit our Web site http://www.nserc.ca/news1.htm.

Science is ... Inventing

National Science and Technology Week, the annual 10-day celebration of Canada's achievements in the fields of science, technology, engineering and mathematics, will take place this year from October 17 to 26.

Thousands of events held across the country will give Canadians of all ages the chance to explore, discover, experiment and invent their way to a better understanding and appreciation of Canadian innovation and its relevance to our economic prosperity and quality of life.

Coordinated nationally by Industry Canada, National Science and Technology Week is a major cooperative effort involving governments, small, medium- and large-sized businesses, scientific, technological, engineering and mathematics associations, educational institutions, museums and science centres, and international partners.

Why not get involved? Become an active partner and play a key role in creating the science and innovation culture that is so important to Canada. To find out how you can get involved,

call toll-free
1-800-268-6608
visit the Web site
http://www.schoolnet.ca
or send e-mail to
NSTW.SNST@ic.gc.ca

$2.6 Million Initiative to Promote Women in Science and Engineering

Over the next five years, NSERC will invest $1.25 million in five new university chairs designed to encourage the participation of women in science and engineering. Its commitment of $250,000 per chair will be matched or exceeded by contributions from Alcan, Nortel, Petro-Canada and IBM.

The role of the chairholders will include developing strategies to encourage female students in elementary and secondary schools to consider careers in science or engineering, as well as sensitizing faculties on how to improve and promote the integration of women students and professionals. Each chairholder will devote up to half of her time to the activities of the Chair, and the remainder to her normal professorial and research activities at the university.

Three of the chairholders are highlighted below, by region. The new chairholders at Memorial University of Newfoundland and the University of British Columbia will be featured in the Fall issue of *Contact*.

Quebec
Corporate sponsor: Alcan Aluminium Limitée
Host: Laval University
Chair candidate: Dr. Claire Deschênes

Dr. Deschênes is an Associate Professor in the Department of Mechanical Engineering at Laval. Seven years ago, she became the first woman engineering professor at Laval University. Since that time, her research has focussed on improving the understanding of water flow in turbines and of the relation between flow dynamics and turbine performance. She has also developed a strong reputation at Laval for the high quality of her teaching and for her initiatives to promote equality of access and to integrate new students (both women and men) into the life of the university.

Ontario
Corporate sponsor: Nortel
Hosts: University of Ottawa and Carleton University
Chair candidate: Dr. Monique Frize

Dr. Frize was the first chairholder of the Northern Telecom-NSERC Women in Engineering Chair, at the University of New Brunswick (UNB). She will be jointly appointed to the Faculties of Engineering at Carleton University and the University of Ottawa. While at UNB, Dr. Frize rose to national prominence championing the chair objectives and raising the profile of women in science and engineering (during her chair tenure the number of women entering these fields increased by 50%). A report produced by the Canadian Committee on Women in Engineering, which she headed, became a guide for many organizations striving to achieve a better gender balance in the profession. More recently, she chaired NSERC's Task Force on Women in Science and Engineering. Dr. Frize was the first woman engineering graduate at the University of Ottawa. She is a biomedical engineer known for her expertise in medical instrumentation and decision-support systems.

Prairie Provinces
Corporate sponsor: Petro-Canada
Host: University of Calgary
Chair candidate: Dr. Elizabeth Cannon

Dr. Cannon is a Professor in the Department of Geomatics Engineering at the University of Calgary. Internationally recognized for her research in geomatics engineering (she was the first Canadian woman to receive a PhD in this field), Dr. Cannon has excelled as a professor and role model, and in her volunteer activities aimed at encouraging women to participate fully in science and engineering. She has been a leader of the University of Calgary's Women in Science and Engineering Program. She has also developed important links with industry and has actively been involved with technology transfer. Her organizational and management skills have been recognized by her election as President of the U.S. Institute of Navigation.

University-Industry Synergy -- You're Invited!

What is it?

The 1997 Symposium on University-Industry Research and Development Collaboration, a two-day symposium organized by NSERC and The Conference Board of Canada to find new ways of fostering closer ties between university and industry researchers. The theme is "Partnering for Innovation and Wealth."

When and where will it be held?

Thursday, October 23 and Friday, October 24, 1997, at the Delta Pacific Resort and Convention Centre in Vancouver, British Columbia.

Why should you attend?

It's your chance to learn, to speak your mind and to contribute to an understanding of what's at stake and how best to build the kinds of relationships that add tangible benefits to industry and university partners. You'll meet other senior decision-makers from small, medium-sized and large organizations, universities, governments and other communities. You'll be informed and inspired by a roster of experts. You'll attend an award ceremony and meet the winners of the R&D Partnerships Awards for best practices in university-industry R&D partnerships.

What topics will be covered?

How universities and industry can effectively reach agreement on the issues of intellectual property rights, overheads, patents and publication rights; how industrial research centres within universities can help foster collaboration between university and industry researchers; how universities and small and medium-sized enterprises can collaborate in securing venture capital; how university reward systems can be changed to help foster collaboration with industry for commercialization and how industry can improve organizational decision-making with respect to R&D by including researchers and university administrators on its board of directors are just some of the topics to be discussed.

How can I obtain the symposium brochure?

Contact:

The Conference Board of Canada
255 Smyth Road
Ottawa, Ontario K1H 8M7
Telephone: 1-800-267-0666 or (613) 526-4249
Facsimile: (613) 521-0661
E-mail: registrar@conferenceboard.ca.

Research Grants Programs: 1997 Competition Results

The Grants Selection Committees reviewed 4,260 applications for Research and Equipment Grants in February: 79% of the applications for Research Grants were funded; 33% of the applications for Equipment Grants (including Equipment, Major Equipment, and Major Installation Grants) were funded.

The accompanying table summarizes commitments resulting from the 1997 competition and instalments of grants awarded in previous competitions. The table does not include a small number of requests for which a decision is still pending.

In addition, NSERC has commitments totalling $3.85 million in 1997 as a result of instalments for 44 Major Facilities Access (MFA) awards made in 1996 and the phasing out of Infrastructure Grants.

1997 Grants Awarded, Including Instalments (in $000)

Grants Selection Committee	Research Grants[1]		Equipment[2]	
	No.	$	No.	$
Animal Biology	233	5,954	14	505
Animal Physiology	206	6,862	14	523
Cell Biology	271	8,753	29	731
Molecular and Developmental Genetics	174	6,613	15	336
Plant Biology and Food Science	304	9,949	40	1,005
Evolution and Ecology	445	12,247	29	762
Psychology	353	9,108	26	518
Solid Earth Sciences	291	8,728	16	768
Environmental Earth Sciences	335	7,791	26	1,197
Inorganic and Organic Chemistry	271	11,946	34	2,527
Analytical and Physical Chemistry	300	11,012	26	1,840
Space and Astronomy	159	4,991	11	216
Condensed Matter Physics	208	6,276	18	943
General Physics	133	3,870	12	709
Pure and Applied Mathematics -- A	299	4,307	1	31
Pure and Applied Mathematics -- B	218	3,121	7	225
Statistical Sciences	241	3,288	11	336
Computing and Information Science	524	12,525	17	985
Communications, Computers and Components Engineering	311	7,100	8	482
Electromagnetic and Electrical Systems Engineering	263	6,381	11	363
Industrial Engineering	227	4,587	9	226
Chemical and Metallurgical Engineering	431	12,333	31	2,147
Civil Engineering	506	11,435	34	972
Mechanical Engineering	496	11,501	33	1,296
Interdisciplinary	59	1,398	4	710
Selection Committee on Research Grants	14	4,710		
Selection Committee in Life Sciences	4	710		

Sub-Total	7,258	192,078	494	25,774
Subatomic Physics[3]	143	11,273	19	2,277
Total	**7,401**	**203,351**	**513**	**28,051**

1 Includes individual, group, and project grants and grants to holders of Women's Faculty Awards.

2 Includes Equipment, Major Equipment and Major Installation Grants; some equipment grants were paid with 1996 funds.

3 There are also 11 Major Facilities Access (MFA) awards in Subatomic Physics totalling $1.229M.

Site Visits Scheduled for the Fall

An NSERC Grants team may be visiting your university in September to explain how the grant selection process works and enhance communications between faculty members, Grants Selection Committee members and NSERC.

Teams representing the **Physical Sciences; Computing and Information Science, Mathematics and Statistics; Engineering**; and the **Life Sciences** will visit most Canadian universities. Visiting teams include members of Grant Selection Committees (GSCs) and NSERC staff.

Visits start with a general information session, covering topics that department chairs have suggested. This session is followed by a workshop on "how to prepare an NSERC application." The emphasis is on familiarizing applicants with the peer review process and the expectations of GSCs about the content and presentation of applications. In the afternoon, the members from each GSC meet with department heads, faculty members and new researchers. They may also tour facilities.

Universities will be visited by a team representing each discipline grouping every three or four years. If you want more information on the schedule and location of events at your university, watch for advertisements at your university in August and September, or contact:

Carole Crête-Robidoux
Telephone: (613) 996-2985
E-mail: coord@nserc.ca.

1997 Site Visit Schedule

	Phys.	Comp./Inf.		

University	Sc.	Sc. Math/Stats	Engineering	Life Sc.
Committees	**08/09**	**07 14**	**04 06**	**03 12**
	24/26	**336/337**	**13 20**	**18 30/31**
	28/29		**334/335**	**32/33**
Acadia				Sept. 23
Alberta	Sept. 23		Sept. 16	
B.C.				Sept. 23
Calgary		Sept. 24		Sept. 15
Carleton	Sept. 22			
Concordia				Sept. 24
Dalhousie		Sept. 16		
Dalhousie Tech.				Sept. 24
Guelph		Sept. 18		
INRS/Télécom.			Sept. 23	
Lakehead			Sept. 25	
Laurentian			Sept. 24	
Laval				Sept. 23
Lethbridge	Sept. 22			
MacDonald Col.		Sept. 26		
Manitoba		Sept. 17		
McGill				Sept. 25
McMaster		Sept. 16		
Memorial	Sept. 22			
Moncton		Sept. 18		
Montréal	Sept. 24			
Mount Allison				Sept. 24
N.B.		Sept. 17		
Northern B.C.				Sept. 22
NSAC				Sept. 22
Ottawa	Sept. 23			
P.E.I.	Sept. 24			

Qc à Chicoutimi			Sept. 22	
Qc à Montréal	Sept. 25			
Qc à Rimouski				Sept. 22
Qc à Trois-Rivières				Sept. 24
Queen's				Sept. 23
Regina		Sept. 16		
Ryerson Poly.			Sept. 23	
Saint Mary's		Sept. 15		
Saskatchewan		Sept. 15		
Simon Fraser				Sept. 24
St. Francis Xavier	Sept. 23			
Toronto			Sept. 22	
Trent	Sept. 22			
Victoria				Sept. 25
Waterloo		Sept. 17		
Western Ontario	Sept. 23			
Windsor	Sept. 24			

Scholarships and Fellowships: 1997 Competition Results

The Scholarships and Fellowships Selection Committees met during February to review the Postgraduate Scholarship (PGS), Postdoctoral Fellowship (PDF) and NATO Science Fellowship applications submitted to the 1997 competition.

This was the first competition following the changes to the PGS and PDF programs announced last summer. As readers were informed in Contact (Vol. 21, No. 2, Summer 1996), NSERC expanded the eligibility criteria for PGS applicants and the selection criteria for both PGS and PDF awards. To ensure selection committees had adequate time to assess the PGS applications according to the new criteria, NSERC had to implement a quota system limiting the number of applications each university could submit; this resulted in a 15% decrease in the number of PGS applications submitted to NSERC.

A total of 1200 Postgraduate Scholarship, 202 Postdoctoral Fellowship, and 9 NATO Science Fellowship awards were approved; in addition, this year NSERC established a list of alternates identified by the selection committees as worthy of PGS support if funds permit. Should some of the candidates originally offered scholarships

be unable to accept them, awards will be offered to those on the list.

The distribution of available PGS awards among the three major discipline areas was again set by an allocation formula that provides for moderate steering toward the Engineering and Computing Sciences disciplines.

1997 S&F Competition Results

Discipline Committee	Award Type	No. of Applic.	No. of Awards	Success Rate (%)
Engineering/ Computing Sc.	PGS	705	480	68.0
	PDF	134	44	32.8
Life Sciences/ Psychology	PGS	808	408	50.5
	PDF	336	81	23.8
Mathematical/ Physical Sc.	PGS	546	312	57.0
	PDF	297	77	25.6
Total	**PGS**	**2,059**	**1,200**	**58.3**
	PDF	**767**	**202**	**26.3**

Students Wanted

It's important for today's students to develop hands-on industrial work experience. NSERC's Undergraduate Student Research Awards in Industry provide a great opportunity for co-op and summer students to do just that. They get the chance to gain research experience in an area relevant to their studies (which definitely beats flipping burgers!) while at the same time earning the money they need to continue their studies the following year. And they get to know the company and enhance their future career prospects -- sponsoring companies often use the program to identify potential future employees. In many cases, this industrial experience will whet the students' appetite for research and encourage them to continue on to graduate studies.

NCE Program Accepting Proposals for New Networks

Researchers and their industry and government partners are invited to apply to establish new Networks of Centres of Excellence (NCEs) in areas of strategic importance to Canada, by submitting Letters of Intent by November 1, 1997.

The Government of Canada issued the call for applications on June 5. Approximately $9 million has been set aside this year for a competition for new NCEs.

As part of the federal government's commitment to Science and Technology, in February 1997 it announced its decision to make the NCE program permanent and to provide an annual budget of $47.4 million. At the same time, the funding period for the networks was increased from four to seven years.

The Networks link teams of researchers from universities, industry and government, allowing them to share skills and resources and collaborate on projects critical to Canadian economic and social development.

At present there are 14 NCEs doing research in health and biotechnology, information technology, natural resources, infrastructure, and computer-based learning. The NCE program is administered by the three federal granting councils: NSERC, the Medical Research Council (MRC), and the Social Sciences and Humanities Research Council (SSHRC), in collaboration with Industry Canada.

Networks of Centres of Excellence are selected after a rigorous peer-review process; the Letter of Intent is only the first step. An international committee of eminent persons with a broad base of expertise will be appointed to review the Letters of Intent that have been received against the five equally weighted selection criteria: research excellence; training of highly qualified personnel; networking and partnerships; knowledge exchange and technology exploitation; and network management. Selected applicants will then be invited to submit full proposals by April 1, 1998.

Information sessions were held across Canada during the week of June 16-20. Details of the call for applications and the program guide are posted on the NCE Web site, http://www.nce.gc.ca, or are available from the NCE Program Directorate upon request.

Making a Future in Industry

One of NSERC's key challenges is meeting the needs of the new generation of Canadian researchers -- helping them launch their

research careers and keeping them in Canada.

Last fall, the Council took a first step towards addressing the issues affecting students and young researchers in the natural sciences and engineering by hosting a national workshop on the Needs of the Next Generation of Canadian University Researchers. Some of the recommendations addressed to NSERC have already been implemented and an Action Plan has been established for dealing with the others.

The Action Plan can be found on our Web site (http://www.nserc.ca/pubs/next.htm).

Many questions were raised at the time about the involvement of young Canadian researchers in industry. In order to explore those questions with people personally familiar with that sector, NSERC is hosting a second national workshop, to take place in Ottawa from October 31 to November 2, 1997, at the Delta Ottawa Hotel.

About 35 to 40 invited participants will discuss different aspects of the theme "Making a Future in Industry." Invitations will be sent out to recent graduate students, undergraduate students considering research careers in industry, representatives of institutions and companies that hire researchers or contract out research, industrial research fellows, researchers with successful industrial experience and researchers with successful academic experience.

Research Update

Canada's growing peat industry receives needed research boost

NSERC and a group of Canadian peat industry partners will contribute $937,000 over the next four years to fund research in restoration techniques for mined peatlands and the development of ecologically based criteria for peatland conservation. Dr. **Line Rochefort** of Laval University's Département de phytologie was awarded an NSERC Collaborative Research and Development Grant entitled "Towards Integrated Management of the Peatlands of Eastern Canada." Dr. Rochefort will carry out the research with co-investigators Drs. **André Desrochers** and **Claude Lavoie** of Laval University and Dr. **Jonathan Price** of the University of Waterloo.

Peat is used extensively by gardeners to increase the earth's ability to hold water. In 1995, over 80% of the Canadian peat industry's $143 million in sales came from exports. The provinces of Quebec, New Brunswick and Alberta account for nearly all of Canada's peat production.

Laval acknowledged the awarding of the CRD grant to Dr. Rochefort at an event in which three new NSERC research networks were announced (see Contact, Vol. 22, No. 1, pp. 12-13).

New U. of Ottawa Chair to investigate mechanism of global warming

On April 15, the University of Ottawa inaugurated a new NSERC Industrial Research Chair in Earth Systems. NSERC, and its industrial partners Noranda Ltd. and Hatch & Associates Ltd., will invest over $1 million in the Chair over the next five years. Chairholder Dr. **Jan Veizer** and his colleagues will examine the dynamics of carbon dioxide, one of the factors responsible for global warming.

Dr. Veizer and his group will attempt to gauge the amount and the fate of carbon that circulated through the water and the atmosphere in the past and compare the pattern to today's. This comparison will enable us to better estimate the impact of changes in the world's fuel burning patterns and the degree of global warming.

The University of Ottawa dedicated the "G.G. Hatch Isotope Laboratories" at the inauguration in honour of Dr. Hatch, the founder of Hatch & Associates Ltd., whose efforts helped in making the research chair a reality. The laboratories will analyse geological samples to provide clues on the chemical composition of ancient seawater as well as an understanding of biochemical processes in present day rivers and lakes.

A bridge not too far

Operating in what might be called the world's biggest research lab, Canadian engineers are monitoring stresses and strains on a giant bridge 1,000 km away.

When the fixed link between New Brunswick and Prince Edward Island opens at the end of May, engineers in Ottawa will be able to keep close tabs on the 13-km Confederation Bridge, tracking details such as vibrations, stresses and torsion at almost any point -- even while those events are occurring.

With new technology, from computer links to orbiting satellites, it doesn't matter where the monitoring facility is located. Computer databases at the federal department of Public Works and Government Services in Ottawa, which administered the bridge construction, will be in constant contact with the bridge. That information will then be distributed to researchers at Carleton University and elsewhere.

The impetus for such a monitoring program began with the Ottawa-Carleton Bridge Research Institute, or OCBRI, which is based at Carleton. OCBRI researchers say data on the causeway, an $860-million project that took four years to build, will be collected over 20 years, creating a valuable knowledge resource for builders and researchers.

"It will benefit the Canadian research community and the construction industry," says Carleton civil and environmental engineering professor David Lau. "No one has ever tried a project of

this scale under these conditions."

Among the conditions are gale-force winds, high waves and sea ice, problems that plague any sort of engineering work on the North Atlantic. Countries such as Norway and the United Kingdom have some experience in this area, but the remote monitoring of the P.E.I. fixed link is a first.

"Performance information on long-span bridges is very scarce, even though Canada is a leader in this field," says OCBRI director Mo Cheung. "We need the information not only to build other bridges, but to properly maintain this bridge." The information comes from an array of sensitive detectors that had to be installed during construction. Some of them are now embedded in concrete, where they report on movements caused by weather conditions and traffic. OCBRI is monitoring five main areas: dynamics, from winds and possibly earthquakes; deformation of material; temperature stresses; ice stresses; and corrosion.

Dr. Cheung, who is also Director of Technology and Environment for Public Works, was inspired to pursue this ambitious project after speaking with engineers working on the English Channel tunnel. They voiced regrets about not having installed detectors as that project proceeded. Now, as they try to assess the tunnel's day-to-day state, they are forced to make educated guesses about what is going on within the elaborate structure.

NSERC has provided a five-year grant of $1.6 million for OCBRI to oversee the monitoring work. Researchers at other universities are also participating in the project, with a total budget of almost $4 million.

"The opportunity to collect and learn from this kind of data is unique," says Dr. Cheung. "This is the kind of real-world research that gives Canada a competitive edge."

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